

SHALLOW ROCK CAVERN

FACTSHEET



At a glance

- Suitable for low-level waste, including waste which may reduce in volume or compact over time, such as paper products.
- Requires suitable geology.
- Makes use of natural barriers.
- Buildings on the surface are relatively small.
- In operation in Finland and Sweden.

The shallow rock cavern disposal method is sometimes used for the disposal of low-level waste, or low- and intermediate-level waste (LLW or L&ILW). A series of rock caverns are excavated at a nominal depth of 50 to 100 meters below the surface in low permeability rock. They are accessed from the surface by a small system of ramps and tunnels.

LLW is placed in the rock caverns by stacking the waste packages without backfilling the space between the packages. Because the rock itself provides structural support, waste that may reduce in volume over time may be emplaced in this type of facility. Once full, each cavern is sealed by constructing a concrete closure wall at the entrance. When the entire repository is full, it is closed by sealing the ramp and shaft with low permeability materials which restrict the flow of water. Additional barriers are installed at the ramp entrance and at the top of the shaft to restrict water inflow and access by people.

All water flowing into the repository during construction and operations is collected in an underground sump. Water from the sump is pumped to a pond on the surface where it is sampled, and if necessary, treated before being discharged. After closure, the underground drainage systems will cease to operate, and the water will begin to slowly flow into the waste-filled rock caverns. Due to the low permeability of the rock and the tight seals in the access ramp and shaft, the flooding process will take many decades.

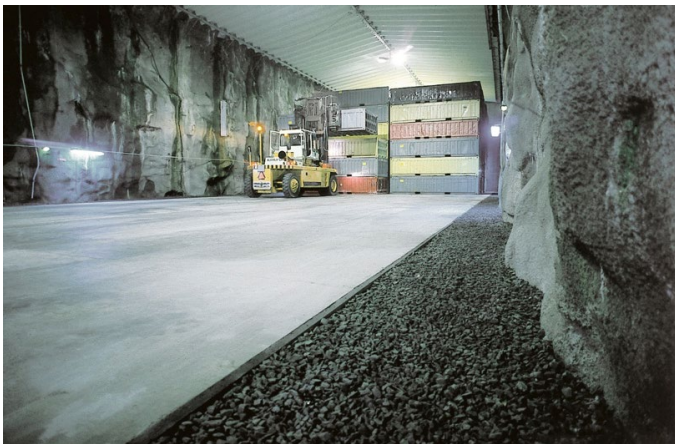
#RadWastePlan
@RadWastePlan
radwasteplanning.ca



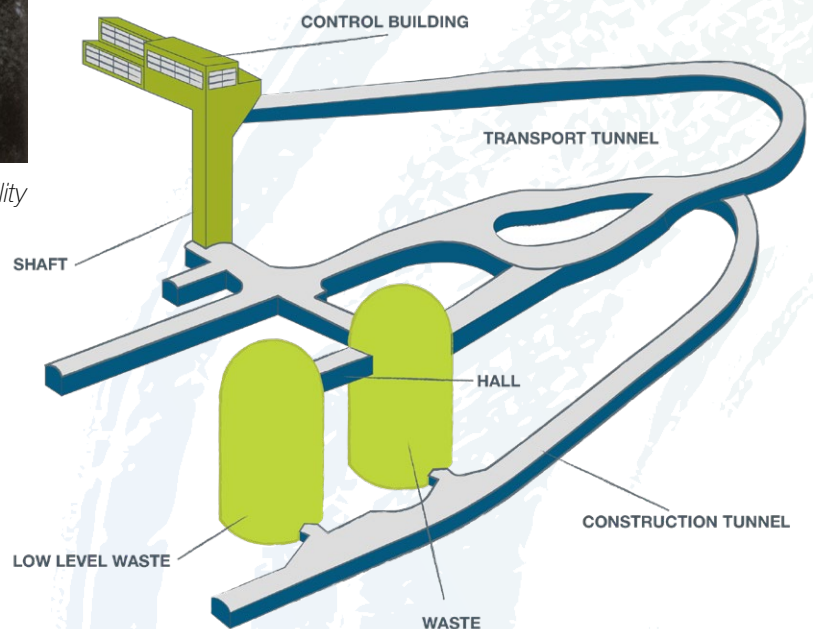
INTERNATIONAL EXPERIENCE

Purpose-built shallow rock cavern repositories have been in operation in Sweden and Finland for nearly three decades. In Sweden, short-lived low and intermediate level waste (L&ILW) is disposed of at the SFR repository which has been in operation since 1988 close to the Forsmark Nuclear Power Plant. This facility is used to dispose of L&ILW from all of Sweden's the nuclear facilities. It is operated by SKB, a waste management company owned by the nuclear utilities. The repository has been excavated in the bedrock under the Baltic Sea at a depth of approximately 50 meters below the seabed and 1 kilometer out from the shoreline. It is accessed by two ramps. The repository will be expanded for the disposal of short-lived L&ILW from nuclear station decommissioning.

Finland currently has two rock cavern repositories for short-lived L&ILW, one at each of the country's nuclear power plants, Olkiluoto and Loviisa. They are owned and operated by the power plant owners for their own waste, with a small amount of space reserved for other sources of L&ILW waste such as industry, research and medicine. Both repositories are excavated in the bedrock at a depth between 60 to 110 meters below ground surface and accessed by ramps. A shaft with an elevator is provided for workers. The repository at the Olkiluoto site began operation in 1992 and the other at Loviisa started operation in 1998. Both repositories will be expanded for the disposal of L&ILW when the power plants are dismantled.



One of the rock caverns for LLW inside Sweden's SFR facility



Schematic of Finland's Repository for L&ILW at Olkiluoto